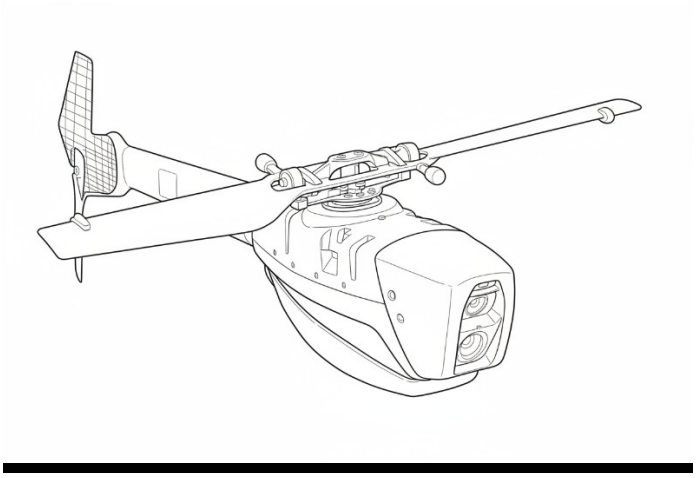
FLIR Systems (Teledyne FLIR) Black Hornet 3 (PD-100 PRS)



IDENTITY & DESIGNATION

Official Designation: Black Hornet 3 Personal Reconnaissance System (PRS); earlier: PD-100 Black Hornet (Prox Dynamics designation)

Manufacturer: FLIR Systems (acquired Prox Dynamics AS, 2016); now Teledyne FLIR (Teledyne acquired FLIR, 2021)

Original Developer: Prox Dynamics AS (Oslo, Norway) --- founded 2007, acquired by FLIR 2016 for $134 million

Country of Origin: Norway (development); USA (current production under FLIR/Teledyne)

Year Introduced: Black Hornet 1: 2012 (UK MoD first operational deployment, Afghanistan); Black Hornet 3: 2018

Variants: Black Hornet 1 (PD-100, 2012); Black Hornet 2 (PD-100 v2, digital link, 2016); Black Hornet 3 (current, encrypted digital, GPS-denied modes, indoor nav, 2018); Black Hornet Nano (export variant)

CLASSIFICATION

Domain: Air

Category: Military / Nano-ISR

Sub-Category: Nano Unmanned Aerial System (nano-UAS) / Personal Reconnaissance System

Terminal Mode: Recoverable --- controlled landing on flat surface

Expendable: No (though cost allows attrition acceptance)

Size Class: Nano (33 grams --- smallest operationally deployed military UAS)

PHYSICAL SPECIFICATIONS

Weight: 33 grams (1.16 oz) --- lighter than a AA battery

Length: 168 mm (6.6 in)

Width (rotor span): 120 mm (4.7 in)

Height: Approximately 40 mm

Configuration: Single-rotor helicopter with counter-rotating tail rotor; conventional helicopter layout at nano scale

Payload: Integrated dual-camera system (visible + thermal) --- not field-swappable

System Weight: Full PRS unit (2 aircraft + controller): approximately 1.3 kg (2.9 lb) total carry weight

PROPULSION & PERFORMANCE

Propulsion Type: Electric brushless micro-motor; single main rotor + tail rotor

Max Flight Time: 25 minutes per sortie (Black Hornet 3)

Max Speed: Approximately 21 km/h (operational; exact figure not published)

Operating Altitude: 10-50 m typical; ceiling approximately 120 m

Range: 1.6 km line-of-sight control

Wind Tolerance: Operable in winds up to 10 knots (18.5 km/h)

Noise Level: Approximately 35 dB at 10m --- below ambient battlefield noise level

GUIDANCE, NAVIGATION & CONTROL

Control Link: Encrypted digital RF link (frequency and exact specification not published for OPSEC)

Navigation: GPS primary; Black Hornet 3 adds visual odometry for GPS-denied indoor navigation

Indoor Mode: Black Hornet 3 specifically designed to navigate building interiors without GPS --- uses optical flow and inertial sensing

Autonomy Level: Semi-autonomous — stable hover, altitude hold, return-to-operator; operator controls direction and camera

Controller: Handheld controller with integrated video screen; single-operator system

Fiber-Optic Option: No

SENSORS & PAYLOADS

Visible Camera: High-resolution color video camera; stabilized gimbal

Thermal Camera: Integrated thermal infrared camera (exact resolution classified)

Video: Real-time encrypted video relay to handheld controller

Imagery Storage: On-board recording capability

No Payload Swap: Integrated sensor suite --- cameras are fixed elements of airframe, not field-swappable

COST & PROCUREMENT

Unit Cost: Approximately $195,000 per system (2 aircraft + controller + accessories)

Per-Aircraft Cost: Approximately $80,000-100,000 per individual aircraft

US Army Contract: $39.6 million contract (2019) for Black Hornet PRS under Soldier Borne Sensor (SBS) program

Operators: United Kingdom (first operator, Afghanistan 2013); United States (Army, Marines, SOF); Norway; France; Germany; Australia; India; UAE; Netherlands; plus classified operators

US SBS Program: Selected as US Army Soldier Borne Sensor; fielded at squad/platoon level across multiple BCTs

COUNTERMEASURE VULNERABILITY PROFILE

RF Jamming: MODERATE — encrypted frequency-agile link; small engagement window due to brief operational sorties

GPS Spoofing: LOW-MODERATE — Black Hornet 3 indoor nav mode functions without GPS; outdoor GPS spoofing affects positioning but not necessarily mission completion

Acoustic Detection: VERY LOW — 35 dB at 10m is below ambient noise in most tactical environments; essentially inaudible at 50m+

Radar Detection: VERY LOW — 33g airframe RCS is at or below detection threshold of most air search radars, including dedicated counter-drone radars

Visual Detection: LOW — 168mm body visible in good conditions at close range; at 30-50m altitude and speed, challenging to visually acquire and track

Thermal Detection: VERY LOW — electric micro-motor generates negligible thermal signature

Physical Intercept: VERY LOW probability — target is too small and maneuverable for conventional intercept; requires specialized small-caliber or net-based capture

EMI/EMC Attack: HIGH — nano-scale electronics with minimal shielding; HPM at sufficient power density would disable platform

Overall Vulnerability Rating: LOW (detection) / HIGH (if detected and HPM available) --- the platform's primary defense is not being found

CRUISE MISSILE CONVERGENCE NOTES

The Black Hornet's encrypted digital link and GPS/visual odometry navigation represent, at nano scale, the same guidance philosophy that defines modern cruise missiles: multiple complementary navigation modes that maintain operation when any single mode is defeated. The indoor visual odometry mode is a direct parallel to the

terrain-contour matching (TERCOM) used by Tomahawk to navigate in GPS-denied environments — different physical mechanism, identical conceptual approach.

At 33 grams and $80,000 per airframe, the Black Hornet sits at the extreme end of the cost-capability spectrum from the cruise missile — but the trajectory is clear. Each generation of Black Hornet has added capability (encrypted link in BH2, indoor nav in BH3) while maintaining the nano form factor. The question for the next decade is whether autonomous swarm coordination can be achieved at this scale, at which point a platoon carrying ten Black Hornets becomes a distributed sensor network with no single point of failure.

OPERATIONAL HISTORY

First operational deployment: British Army, Helmand Province, Afghanistan, 2013. Used for building clearance operations, reducing casualties from ambushes in compound entries. UK MoD credited Black Hornet with 'significant reduction' in casualties during route clearance and building entry operations. US Army operational fielding began 2019 under SBS program; deployed to multiple theaters. Norwegian SOF operators (original home nation of developer). French Foreign Legion operations. Australian deployment in Afghanistan and subsequent domestic training use.

Black Hornet has been evaluated or fielded by more than 30 nations' military and law enforcement agencies. Its combination of genuine operational utility and extreme portability has made it the first nano-UAS to achieve widespread adoption at the squad level rather than only at special operations units.

SOURCES & CROSS-REFERENCES

Manufacturer:
https://www.teledyneflir.com/products/unmanned/black-hornet-personal-reconnaissance-system/

Cross-Ref: See also: Orbiter 2 (larger tactical ISR comparison); AeroVironment Snipe (US competitor in nano class); DJI Mini 4 Pro (commercial nano comparison — 10x heavier but comparable sensor capability at 1/40th the cost)